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Electric Heating Devices

Their Latest Commercial Development

BY

H. J. MAUGER

Read before the Ohio Electric Light Association at its Twelfth Annual Convention
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ELECTRIC HEATING DEVICES

THEIR LATEST COMMERCIAL DEVELOPMENT

By H. J. MAUGER

During the past two years the subject of electric heating has awakened widespread interest on the part of Central Station men.

The Ohio Electric Light Association, I believe, was the first State Association to give the matter serious attention, a



Some Electric Cooking and Heating Devices

paper on the subject having been presented in 1904 by Mr. H. W. Hillman at Sandusky; and since then it has been a subject for discussion at nearly every electric light convention.

It is a pleasure to present the subject of electric heating before this association, as I am able to report distinct progress and definite achievement. It is a satisfaction to engage your attention with a matter which is of most vital importance to yourself and so pregnant with possibilities. Already the manufacture of heating devices has assumed large proportions, and the business of next year will undoubtedly go over \$1,000,000. But every dollar's worth of heating devices sold means so many kilowatts connected.

Why the field of electric heating lay dormant so long, or why it has lately assumed such large proportions need not be fully discussed. The Central Station man in the past has been occupied with the problems of generation and distribution, rather than the sale of his electric current, and both the subject of electric heating and the devices themselves lacked his confidence.



Dining Room with Luminous Radiator, Coffee Percolator, Chafing Dish, etc.

But now it is different. There has been a "commercial awakening," business getting departments have been organized, and a demand created for new current consuming devices. Electric heating is now of vital interest and the question may be put directly. What is your relation to this subject? Are you alive to its possibilities? What are you doing with electric heating devices in your town? How many flat irons have you installed? Do you know that 1,000 flat irons will bring in \$10,000 per year—a day load at lighting rates?

In this paper I will try to throw some light on these ques-

tions. I will talk, however, from the general standpoint, rather than on special or local conditions, in which any of you may find yourselves. I note that in many places you have 30c. natural gas to compete with and each case has its special problem to be worked out locally.

PART I.—DESCRIPTION OF DEVICES

In the first place the devices which I will describe—whatever may have been the shortcomings of heating devices in



Luminous Radiator

the past—are worthy of your full confidence; they represent the latest developments of electric heating devices; are a distinct advance in engineering design and commercial adaptability. They are reasonable in cost, attractive in appearance, sturdy and simple in construction, washable, renewable, and efficient; but, above all, durable. They will not burn out if carelessly operated "dry."

In this apparatus two distinct types of heating elements are used, applied to devices as best adapted, viz.: the cartridge unit type and the quartz enamel type. The luminous radiator and the heating pad are exceptions to this classification.

THE CARTRIDGE UNIT TYPE

The well known edgewise wound resistance, which has been so successful in its application to arc lamp resistance, is used in the "cartridge unit" type. The edgewise resistance consists of a flat ribbon wound edgewise on an arbor, the turns being in-

sulated, but held together by an insulating cement; the whole forming a solid tube. This resistance tube is wrapped with a thin sheet of mica, and is enclosed in a shell or cartridge, which is inserted in a close fitting chamber, as in the flat iron, stove or other devices, and is readily replaceable.

QUARTZ ENAMEL TYPE

A flat disk of spirally wound resistance wire forms the heating element in this type, and it is electrically insulated from the surface to be heated by "quartz enamel," which is



Heating and Cooking Apparatus

infusible, a good electric insulator, yet a fair conductor of heat. This unit may also be easily replaced, if necessary. The use of quartz as a separating insulator gives great durability to this form of heating element. Enamel alone would not be satisfactory, but it makes an excellent binder for the quartz grains. Dishes of this type have large surfaces exposed to the heating element.

DURABILITY

Most heating elements fail when they are allowed to operate "dry," that is, doing no work. In this case the temperature of the heating elements become excessive and they burn out. The devices presented to you in this paper are so designed that the heating element will never become destructively overheated under conditions of service. This is the secret of the long life which these devices attain. A safe working temperature can never be exceeded.

Table I. shows durability test on four flat irons using cartridge unit heaters of 500 watts capacity. Such a test is the equivalent in thermal effect of 200% over load under normal conditions.

	Hours on Circuit	Condition of Heating Element
1	4501	Perfect
2	4097	Perfect
3	3700	Perfect
4	2569	Perfect

This test was a continuous run, but intermittent tests were also made (6 hours off and 18 hours on) giving the irons a chance to expand and contract by heating and cooling. This was continued for 2,351 hours and no destructive effects could be observed.

I give here four tests to which the quartz enamel pint water heater was submitted; the showing is remarkable.

Test 1. Pint water heater was filled with cold water and boiled, a five minute interval for cooling with current off was allowed, then cold water was dashed in—repeated 60 times.

Test 2. The previous test was repeated 60 times with two minute intervals for cooling with current off.

Test 3. Same as test 1 with twenty second intervals dry with current on.

Test 4. Test 1 repeated 60 times with 45 second intervals with current on.

SAFETY

While the subject of safety may not be discussed at length, it is one of great importance, particularly as the Central Station that handles these devices stands more or less as sponsor to the general public.

In both the cartridge unit and quartz enamel types of devices safety has been carefully considered. The "3 Deck" heat insulated flat iron stand operates so cool at the part which rests on the table that it can be touched by the hand without burning.

In the liquid heating devices in which the quartz enamel heating element is used, the resistance will not burn out or cause an arc. The devices are free from solder and are provided with heat insulated legs and a bottom shield, so that even if allowed to run dry they will not set fire to or scorch the table.



Coffee Percolator

CONVENIENCE AND ECONOMY

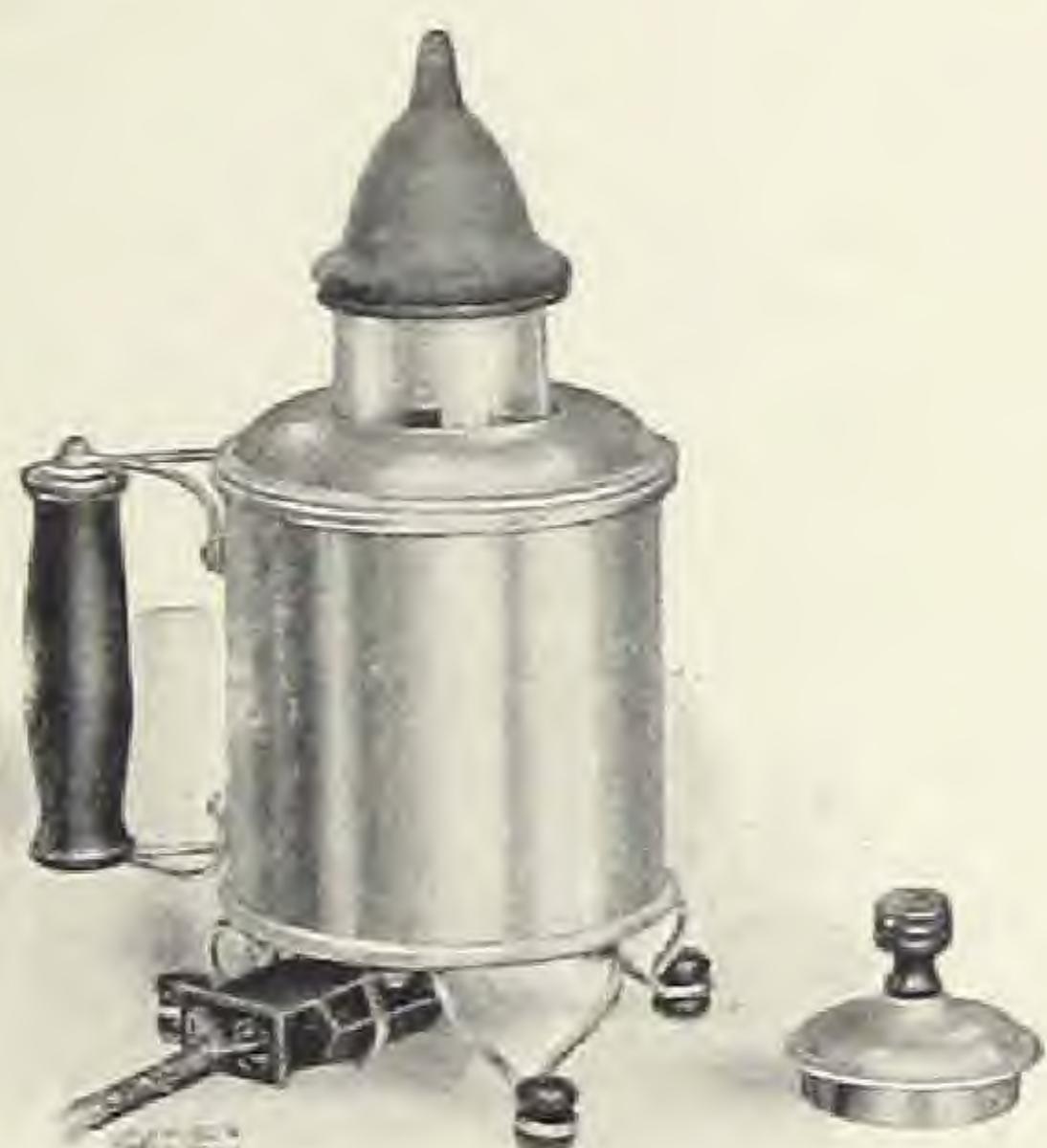
The cartridge unit flat iron is provided with a combination indicating switch and detachable connector. This attachment is convenient and economical, because it provides ready means of turning off the current when the iron gets a little too hot. Thus the temperature is easy to control, and the regulation insures more satisfactory work. With the use of this attachment the 500 watt irons doing ordinary domestic work will only average from 350 to 375 watts.

In the glue pot, by unique design and the omission of the usual water bath, economies of 25% to 100% are effected over previous designs.

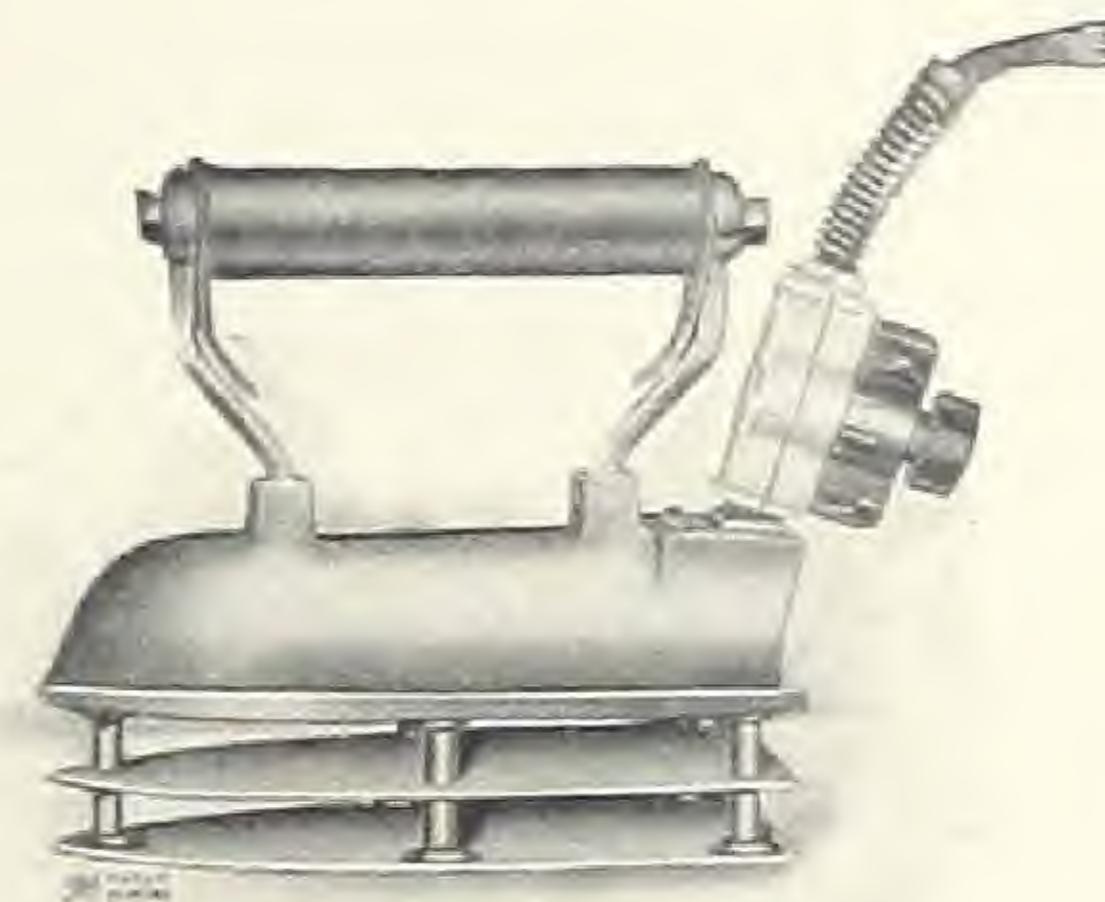
The coffee percolators and chafing dishes are made with self-contained units—a much more efficient plan than the older disk stove combinations.

The percolator, properly used, will make coffee, starting with hot water, in six minutes. No regulation is necessary.

In the chafing dish the heat is regulated by merely changing the position of the connector; no special switch being required.



Baby Milk Warmer



Flat Iron

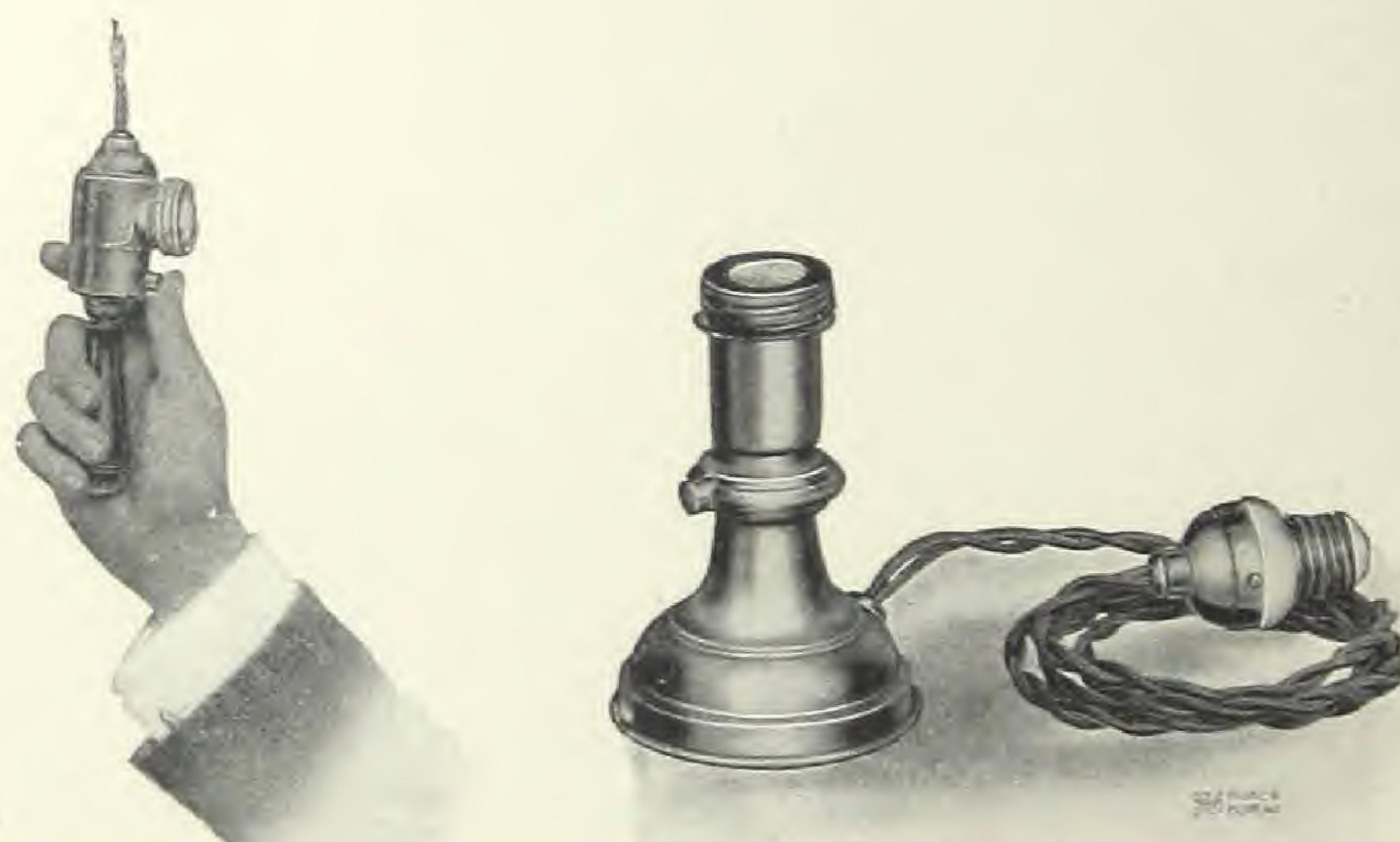
The cigar lighter is a marvel of convenience and uses current only while the finger is pressed on the button. It gives 300 lights for a cent!

COOKING BY STEAM

By reason of its great economy, the practice of steam cooking with electric heaters deserves special consideration. Only devices that are indestructible, that is, safe to run dry can be used in this way.

I can illustrate by the baby milk warmer. A tablespoonful of water is put in a pint water heater and the milk bottle placed in position—all pint and quart water heater covers are provided with a central opening for this purpose. In less than a minute this small amount of water becomes steam and in four minutes the milk is ready for the baby. No time has been lost in heating up a large amount of water. Soft boiled eggs may be prepared in the same manner in four minutes.

With the cereal cooker, made in quart and two quart sizes, coffee may be made, eggs boiled, vegetables steamed and cereal cooked with one heating of water. In this case a quantity of water is heated for the coffee, and, when boiling, is drawn off for the percolator, a few tablespoonfuls being retained in the dish to continue the other operations by steaming. This is as radical in method as it is in improved economy.



Cigar Lighter: Pendant and Desk Types

The previous suggestions indicate the convenience of these combination devices and methods. There are undoubtedly future possibilities, which will make for increased efficiency and greater convenience.

PART II—EXPLOITATION

Heating Devices may be divided into lighting circuit devices and heating circuit devices.

The lighting circuit devices are those which take about 500 watts or less and are not too large to be used on ordinary branch circuits. They require no special wiring.

The heating circuit devices are those for which special wiring is necessary.



Kitchen Cabinet arranged for Electric Cooking

Lighting circuit devices include flat irons, water heaters, baby milk warmers, coffee percolators, chafing dishes, cigar lighters, shaving mugs, curling iron heaters, heating pads and small disk stoves.

Heating Circuit Devices include cooking and baking outfits, ovens, grids, broilers, large stoves and radiators.

SECTION I—LIGHTING CIRCUIT DEVICES

The important question for the Central Station Manager is, "How shall I push these devices? Shall I push them all at



Water Heaters

once, or can a wise selection be made?" For illustration, cigar lighters mean very little to the Central Station from the stand-point of income. On the other hand a flat iron will use two or three kilowatt hours a week and should bring in an income of \$10.00 per year. The flat iron load is in the "Valley," but the price is "Peak," and there is no increased investment for meters or transformers.

Beyond all doubt the flat iron is now the device capable of bringing in the largest income with the least expenditure to the Central Station; the future gives promise of a large income from cooking and baking outfits.

The wise Station Manager will, therefore, give his close attention to electric flat irons. He will not rest until every household on his circuits has an electric flat iron.

The best, and I might almost say the only way to distribute flat irons is to leave them on trial by personal solicitation. To my knowledge several hundred Central Stations are successfully using this method.

The Schenectady Illuminating Company has a wagon (photograph of which is shown) with a man and a boy. With this equipment a hundred irons can be placed a week, and the Company has ordered 5000 irons, 100 of which are to be delivered every week. Upwards of a thousand have been placed.



Heating Apparatus Delivery Wagon

At Montpelier, Vt., where a population of 20,000 is served, 400 irons have been placed in two months with only one solicitor.

In Washington, D. C., the solicitor averages from 25 to 50 irons a week, and this record has been kept up since early spring.

At Jackson, Mich., last year there were placed 700 irons among about 800 residences. In this case the regular meter readers and collectors were also solicitors and no additional force was required.

The foregoing instances are mentioned at random and the space at my disposal is too brief to enumerate more of the many Central Stations equally successful in the distribution of flat irons among their customers. In nearly every case the method was the same, supplemented by advertising.

The monthly bills were largely used to distribute circulars and pamphlets. Demonstrations were also used to gain attention and arouse interest in the general subject; but advertising or demonstration alone cannot be recommended to sell electric heating devices.

The Seattle Lighting Company made arrangements with the newspapers to use electric flat irons for subscription premiums. Through the medium of the newspapers in this way the Seattle Company has placed over 3000 flat irons this season, but the subscription campaign was carried on largely by solicitors as well as by the liberal newspaper advertisements of the newspapers themselves.



Chafing Dish

It is, of course, needless, before an audience of intelligent Central Station men, to dilate on the advantages of ironing by electricity.

While the distribution of flat irons among your residences means the largest business, yet Commercial Laundries offer an attractive field and should in no way be neglected.

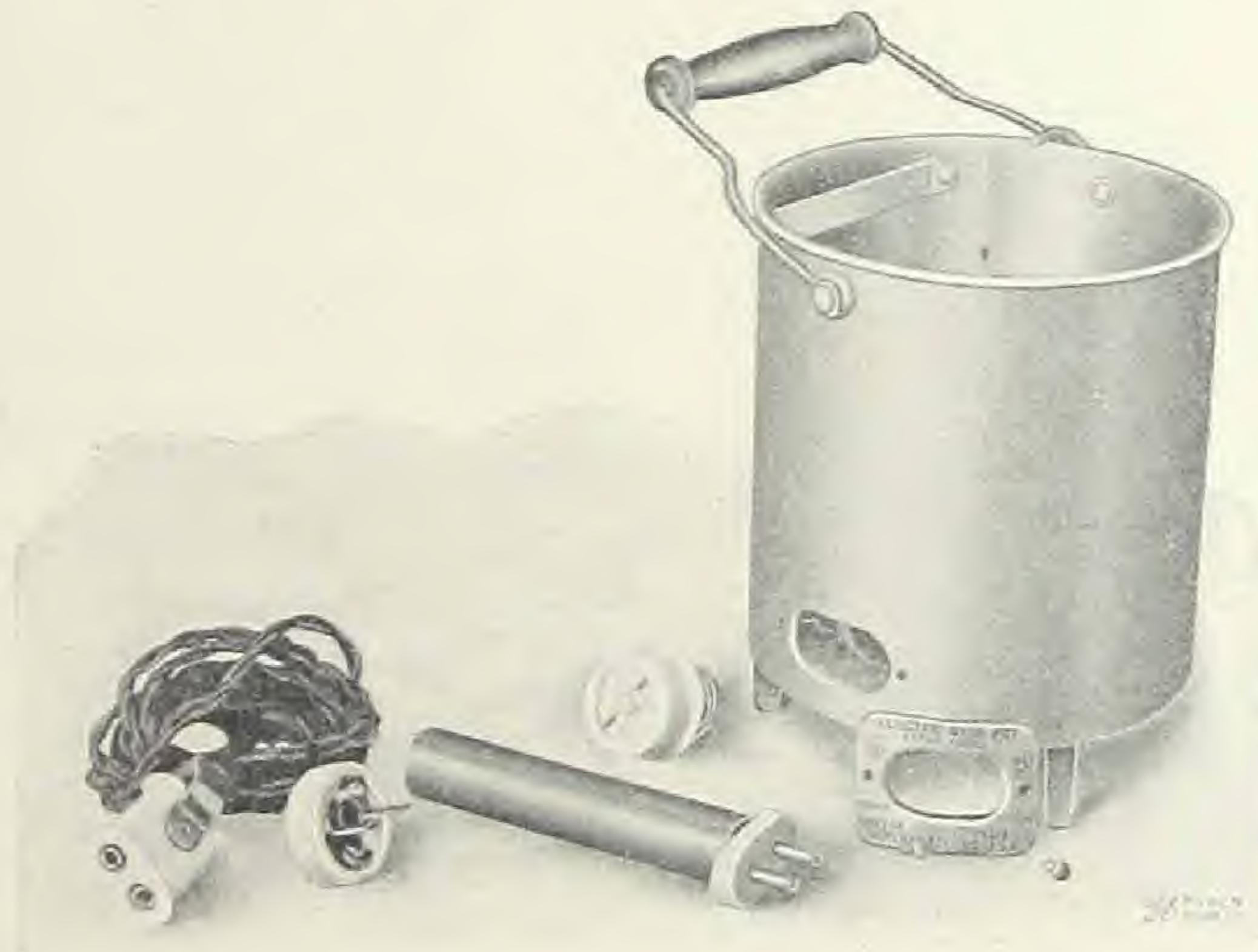
The Los Angeles Company has been very successful with laundry installations and has a large income from this source. Of course it should be remembered that laundry installations will not be successful at lighting rates. It will be necessary to make them a 3 to 5c. rate; but it is splendid power business as the irons will be used 10 hours a day, six days in a week.

Laundries are willing to pay a little more for ironing by electricity than by the older methods, in consideration of the great convenience to the operators, the improved character of the work and the greater output per operator.

MISCELLANEOUS LIGHTING CIRCUIT DEVICES

Having aggressively pushed the flat-iron campaign, the next step is to take up the other attractive heating devices which are suitable for lighting circuits. In this case liberal advertising should be resorted to, educating the general public to appreciate the attractive and economical points of these devices. Demonstrations are also effective.

The coffee percolator may be selected as one device that can be very largely introduced, and which will be used at least once, if not twice, a day by every family. The electric coffee percolator has no real competitor. I have never seen a case where gas percolators were used on a dining-room table, and alcohol is

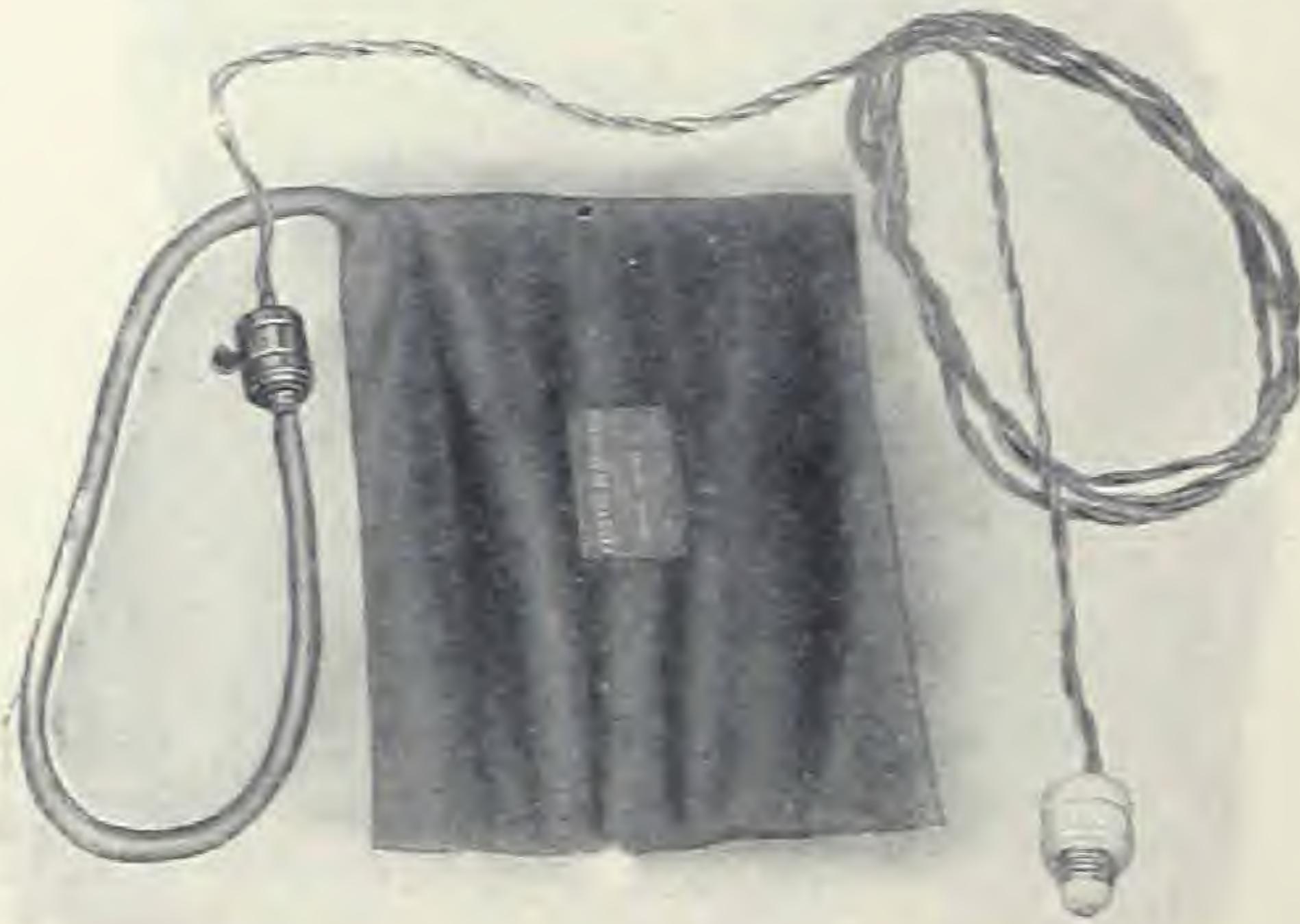


Electric Glue Pot

hardly a competitor of electricity. Educate the public to the idea that percolation is the only proper method of making coffee. It does not extract nearly as much tannic acid, and does not boil off the delicate aroma of the coffee bean. In this subject you have splendid advertising material. While the expense of a few cents a week for making coffee is a very small consideration to the ordinary family, yet, the aggregate means a good deal to the Central Station.

Another popular device is the baby milk warmer, which, if properly exploited, should be placed in every home where there is a baby. The family would be willing to pay a good deal, (which, as a matter of fact, it does not) for the great convenience of this device. Each baby milk warmer will bring in more income than a coffee percolator.

The next device is a very popular one, which has splendid talking and advertising points: the electric heating pad. Nearly every home has the old-fashioned and highly inconvenient hot water bag, and with proper enterprise the electric device should be made to replace the hot-water bag completely and become indispensable. Every physician in your town should have one, and I think it would be good advertising to present him with a pad, ask him to investigate its advantages, and he will recommend it to his patients. Drug store displays will also increase sales, and a supply furnished the principal druggists in town to be sold on a commission basis without investment on the part of the druggists would undoubtedly bring gratifying results.



Heating Pad

I have selected these three prominent devices for illustration as time does not permit me to discuss the other miscellaneous lighting circuit devices, such as water heaters, shaving mugs, curling iron heaters, etc.

Let me say that you should co-operate with the Wiring Contractors, Architects and Builders. Educate them so that they will provide every wired house with numerous outlets for attaching electric heaters to the lighting circuits. It means more business to the wiring contractor in wiring outlets; he will co-operate with you if properly treated. The architect must be up-to-date and be able to suggest new things to hold or increase his prestige.

The builder can easily charge a few dollars more for a house that is thoroughly up-to-date, and even if he does not, the other things being equal, *his* house will find the most ready sale or rent.



Corner of Electrically Equipped Bathroom

SECTION II—HEATING CIRCUIT DEVICES

The development of electric heating and cooking has now proceeded to a point, where, I believe, the use of larger devices for separate "heating circuits" can be strongly recommended.*



Electric Kitchen

The General Electric Company is now prepared to furnish complete electric cooking outfits, and encourage the building of "electric homes;" and I know that progressive lighting Companies will co-operate and encourage the use of these devices by lower rates.

* The "heating circuits" are, of course, used for power as well, supplying current for the numerous motors useful about a modern residence, such as sewing machine motors, buffing and polishing motors, grinding and sharpening machines, fans, washing machines, churns, refrigerators, compressed air motors for housecleaning, coffee grinders, meat grinders, ice cream freezers, massage motors, etc., etc.

It is evident that while a large business can be done on miscellaneous lighting circuit devices, yet this field will be largely increased if attention is given to the wiring of new houses with additional outlets on the lighting circuits. It is further evident that the large volume of business, for which we look in the future, will require special heating circuits, and the development of the business will be in proportion to the attention given to this subject of wiring. Thus the development of this important increase in revenue is distinctly in the hands of the central station men, and too much stress cannot be placed on the necessity for immediate action in getting the co-operation of architects and builders and the interest of the public. It is a condition which must be met, and the sooner the better, in view of the time it will take to bear fruit. All that I have said in the last paragraph of the previous section needs to be emphasized in connection with the *special heating circuits*.

Let me again sound the keynote, "Co-operation." The up-to-date architect must get in touch with this subject. Such a prominent architectural magazine, as "Homes and Gardens," recently published an article on "Electricity in the Home," with special reference to the electric heating and wiring. Other architectural magazines are keen to get material. The local architect should be coached by the Central Station, and his interest in this question clearly pointed out.

The progressive wiring contractor or supply dealer will approximately double his wiring contract. He must be in a position to intelligently advise the public. The interests of the people will be served if both the central station and the wiring contractors become "heating engineers," and naturally the Central Station should take the initiative and seek to gain this co-operation. I will show later how the manufacturers of heating devices will co-operate with furniture manufacturers and dealers.

The architects, builders, wiring contractors and supply dealers, then, are the allies of the Central Station in waging its campaign to sell more current to the public; and heating circuit devices promise to be effective ammunition.

If you ask me the best way of starting this campaign, I should say unhesitatingly, build a house yourself thoroughly

equipped for heating devices with both lighting circuit and heating circuit outlets. If you are not in a position to build a house yourself, your influence should be exerted to get some one in your vicinity to build such a house. It would be easy then to arouse interest in the subject. It is the best possible demonstration.

It was my privilege to address the Vermont State Electrical Association last fall on the subject of electric heating devices and the result was that Mr. J. E. Davidson, General Manager of the Consolidated Lighting Company of Montpelier determined to build such a house.

His house was finished in June and he is very enthusiastic over the new proposition; it has aroused a great interest and numerous inquiries are being received for cooking and baking outfits, and doubtless special attention will be given to the subject of electric wiring in every new house in the vicinity. It is this progressive spirit shown by Mr. Davidson that will make the heating business on a broad scale successful among central stations.

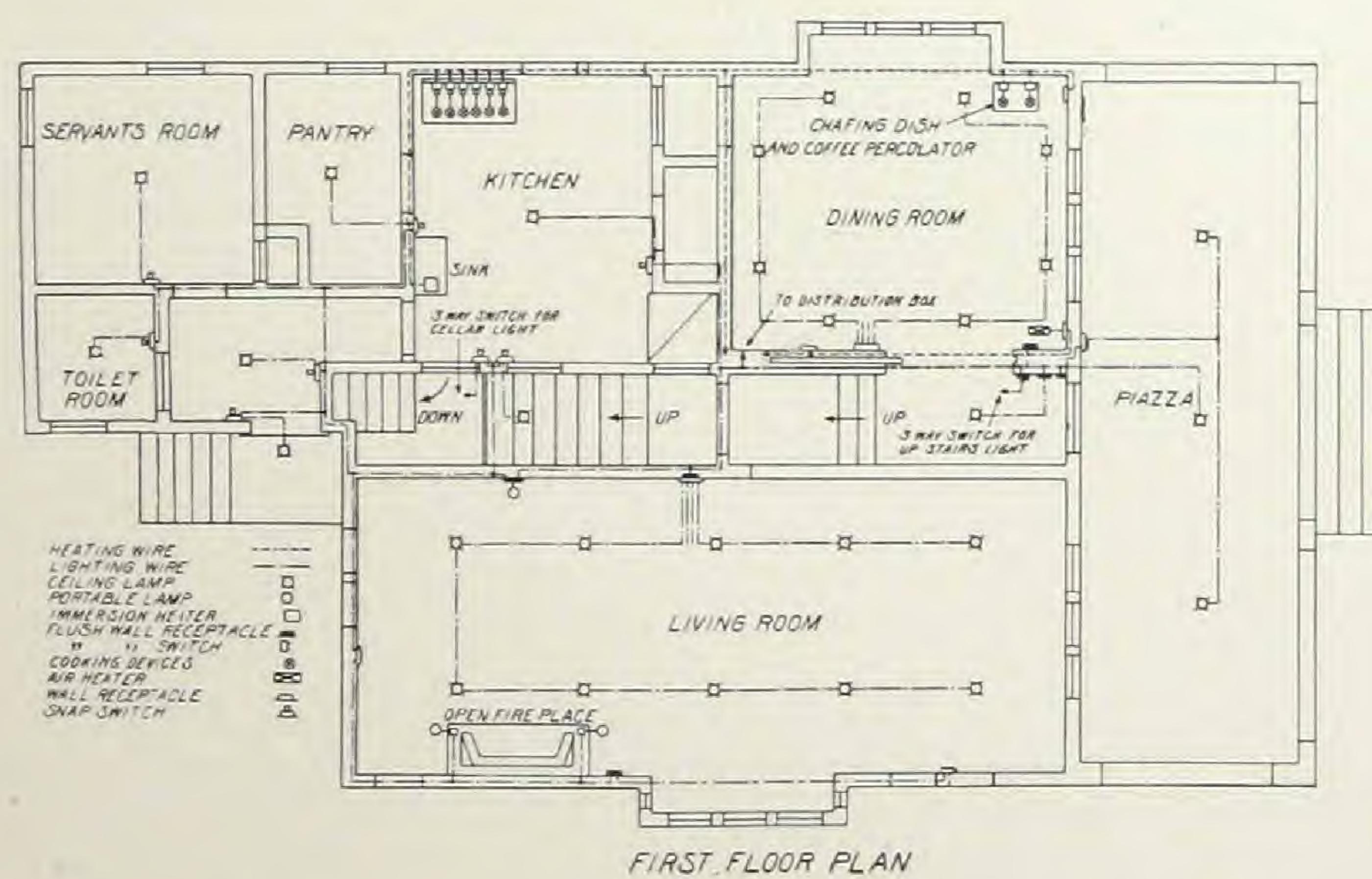
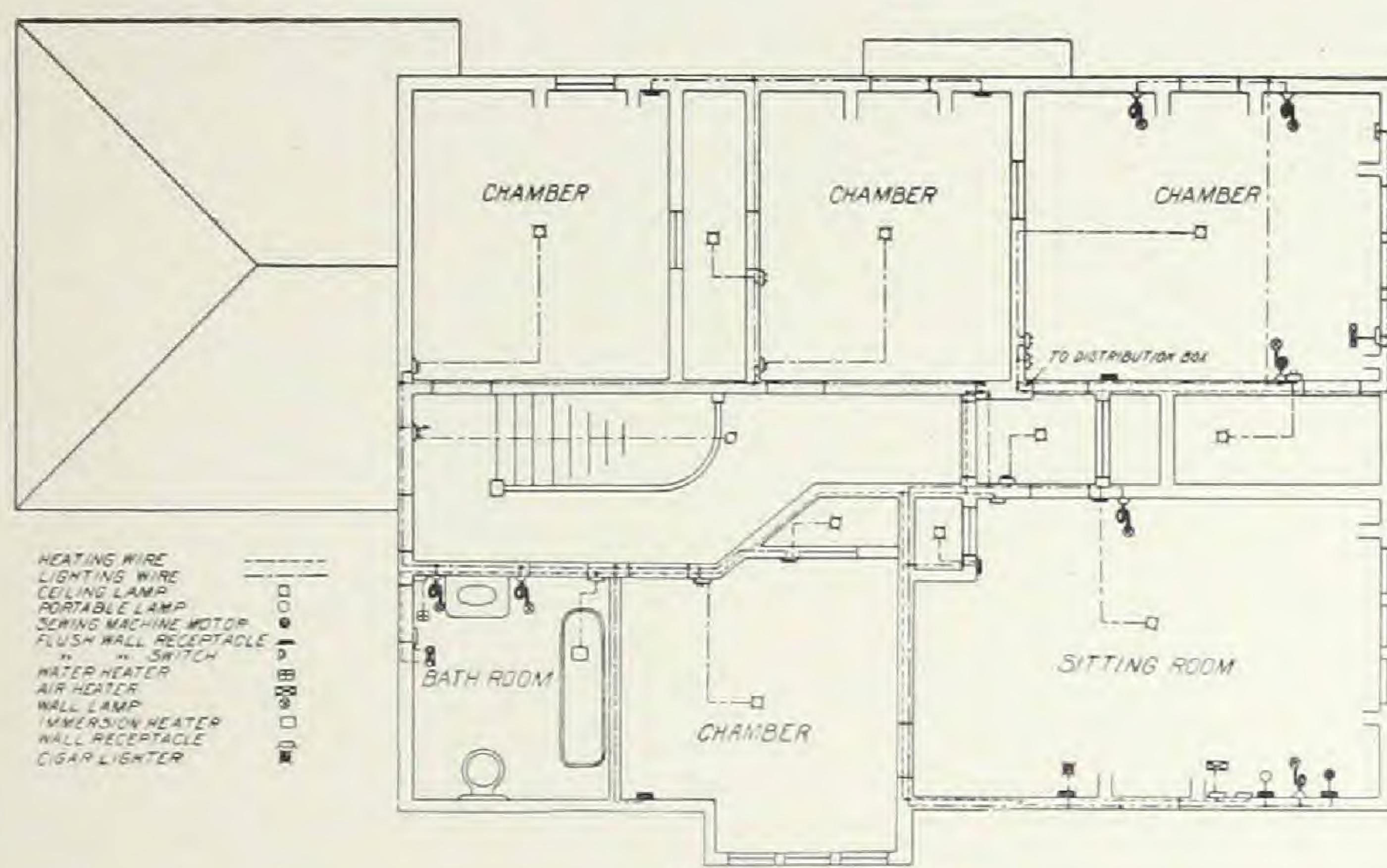
Since Mr. Hillman spoke to you two years ago on the subject of electric heating and explained to you what he was doing in his own home, he has since built a new residence carrying out his ideas of double wiring.

Wiring plans of the residence accompany this paper. The excavation for the cellar is made only under the back part of the house. There is a space for a small store-room, furnace-room and laundry.

The laundry includes wash-tubs, electric wash boiler and electric flatirons.

The dining-room is provided with chafing dish table, a luminous radiator on the heating circuit and with the cigar outlet on the lighting circuit. The chafing dish table is provided with two outlets, so that a chafing dish and coffee percolator may be used at the same time. The luminous radiator is not used any great length of time, but it is used nearly every morning in the cold weather for a few minutes and adds greatly to comfort at the breakfast table.

In the sleeping rooms, outlets are provided for heating pad, baby milk warmer and luminous radiator, the latter being used frequently.



Plans of Residence Wired with Separate Heating Circuit

In the sewing-room, which is also a sitting-room, outlets are provided for luminous radiator, pressing irons, sewing machine motor and one outlet for miscellaneous heater.

In the bath-room, outlets are provided for luminous radiator hot water heater and bath tub heater. A continuous flow type

TABLE SHOWING AMOUNT OF ELECTRICITY USED AND TIME WHEN USED FOR AVERAGE COOKING BAKING, IRONING AND MISCELLANEOUS HEATING DEVICES

DAY	Breakfast 6.30-8.00	Baking 8.00-11.00	Ironing 7.00-11.00	Dinner 11.30-1.00	Misc. Day	Supper 4.30-8.00	Misc. Night	TOTAL
MONDAY	$\frac{3}{4}$ Kw.H.	1 Kw.H.	0 Kw.H.	1 $\frac{1}{2}$ Kw.H.	$\frac{1}{4}$ Kw.H.	$\frac{1}{2}$ Kw.H.	0 Kw.H.	4 Kw.H.
TUESDAY	1 Kw.H.	0 Kw.H.	2 $\frac{1}{2}$ Kw.H.	1 $\frac{1}{2}$ Kw.H.	$\frac{1}{2}$ Kw.H.	1 Kw.H.	$\frac{1}{2}$ Kw.H.	7 Kw.H.
WEDNESDAY	$\frac{3}{4}$ Kw.H.	3 Kw.H.	0 Kw.H.	$\frac{3}{4}$ Kw.H.	0 Kw.H.	$\frac{1}{2}$ Kw.H.	0 Kw.H.	5 Kw.H.
THURSDAY	$\frac{3}{4}$ Kw.H.	0 Kw.H.	0 Kw.H.	1 Kw.H.	$\frac{1}{2}$ Kw.H.	0 Kw.H.	0 Kw.H.	2 Kw.H.
FRIDAY	1 Kw.H.	0 Kw.H.	0 Kw.H.	1 Kw.H.	0 Kw.H.	$\frac{1}{2}$ Kw.H.	$\frac{1}{2}$ Kw.H.	3 Kw.H.
SATURDAY	$\frac{3}{4}$ Kw.H.	3 Kw.H.	0 Kw.H.	$\frac{3}{4}$ Kw.H.	1 Kw.H.	$\frac{1}{2}$ Kw.H.	0 Kw.H.	6 Kw.H.
SUNDAY	$\frac{1}{2}$ Kw.H.	0 Kw.H.	0 Kw.H.	2 $\frac{1}{2}$ Kw.H.	0 Kw.H.	0 Kw.H.	1 Kw.H.	4 Kw.H.
TOTAL	5 $\frac{1}{2}$ Kw.H.	7 Kw.H.	2 $\frac{1}{2}$ Kw.H.	9 Kw.H.	2 Kw.H.	3 Kw.H.	2 Kw.H.	31 Kw.H.

LIGHTING

MONDAY	0 Kw.H.	1 Kw.H.	$\frac{1}{2}$ Kw.H.	1 $\frac{1}{2}$ Kw.H.				
TUESDAY	0 Kw.H.	$\frac{3}{4}$ Kw.H.	$\frac{1}{2}$ Kw.H.	1 Kw.H.				
WEDNESDAY	0 Kw.H.	1 Kw.H.	$\frac{1}{2}$ Kw.H.	1 $\frac{1}{2}$ Kw.H.				
THURSDAY	0 Kw.H.	1 Kw.H.	1 Kw.H.	2 Kw.H.				
FRIDAY	0 Kw.H.	$\frac{3}{4}$ Kw.H.	$\frac{1}{2}$ Kw.H.	1 Kw.H.				
SATURDAY	0 Kw.H.	1 Kw.H.	$\frac{1}{2}$ Kw.H.	1 $\frac{1}{2}$ Kw.H.				
SUNDAY	0 Kw.H.	$\frac{3}{4}$ Kw.H.	$\frac{1}{2}$ Kw.H.	1 $\frac{1}{2}$ Kw.H.				
TOTAL	0 Kw.H.	6 $\frac{1}{4}$ Kw.H.	3 $\frac{1}{4}$ Kw.H.	10 Kw.H.				

Representative of a summer month. Kw.H. means kilowatt hour
Energy used for 4 wks. = 4 x 31 Kw.H. = 124 Kw.H. at 5cts. per Kw.H. = 5 x 124 = \$6.20.

of water heater gives two quarts of water per minute at the temperature of 105 °F. to 120° F.; depending upon the temperature of the city mains; it consumes 3 kilowatts. The time usually required to obtain water for a bath is from 10 to 15 minutes. The comfort and convenience of the luminous radiator in the bath-room can be well appreciated.

In the kitchen there is no coal or gas range; the electric outfit which Mr. Hillman has found so eminently satisfactory is the only means provided for cooking. There is a hot air register in the kitchen as well as the laundry, and both these

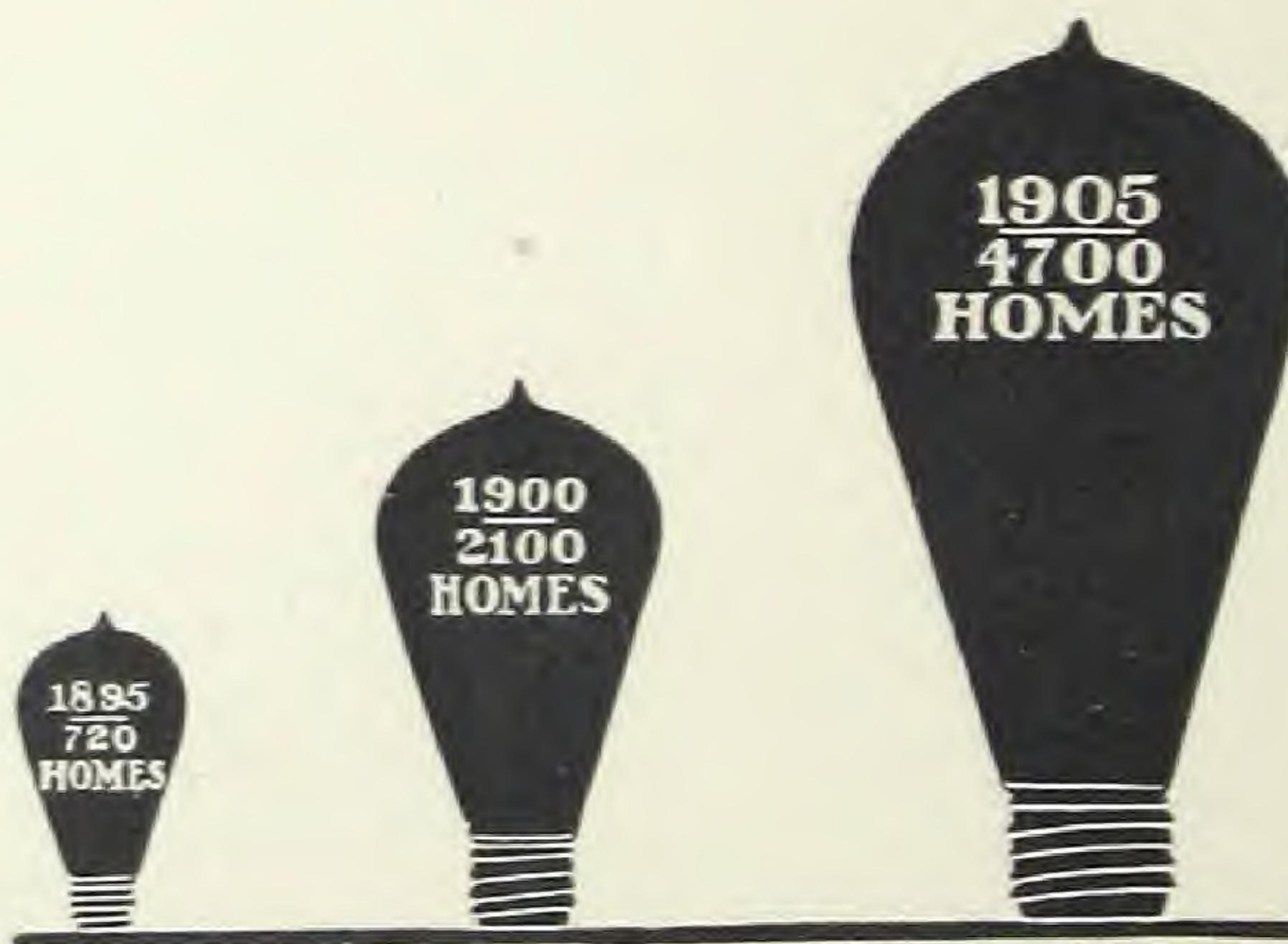


Monthly Bills for Electric Lighting and Heating

rooms are heated from the furnace, which also supplies hot water from October until May. The kitchen is smaller than would ordinarily be necessary for a house of this style.

A photograph is reproduced showing Mr. Hillman's monthly bills for a period of 24 months. The average cost is \$6.69 per month, only slightly more than his coal and gas bills previously, which would average about \$6.00 per month. The table shows an analysis of the current consumed by Mr. Hillman's family, covering one month, the bill being \$6.20 at a 5c. rate, and gives the amount of electricity and time used.

Here is a resident customer paying the Schenectady Illuminating Company about \$110.00 a year as against the average of \$35.00 a year formerly paid for light. It shows a possibility of increasing your residence business 200%. If all of the one to two million resident customers in this country were using cook-



Increase in Residence Customers at Boston

ing and baking outfits, it would mean an annual increase of income to the Central Stations in this country of between \$100,000,000 and \$200,000,000. That is the ultimate possibility towards which we should work. Moreover it should be remembered that the number of residences wired in this country is constantly increasing. An interesting diagram is given showing the increase in residence customers of the Boston Edison Company.

In Schenectady, where we have a 5c. rate for electric cooking, there are now 16 families using cooking and baking outfits.

It should be remembered that the monthly bills include more than electric cooking. They include washing, ironing, and in cold weather the use of electric radiators.

COMBINATION IDEAS

As new methods such as cooking by steam are developed, further economies in electric cooking will be effected. A customer in Schenectady, who has an electric outfit, had a special cover made for his frying pan with a double perforated shelf inside,



Electric Stove

making a small but very satisfactory oven. The idea suggested itself when he noticed that the cook used a large oven nearly an hour to bake one potato, which made the baked potato rather expensive.

Under the heading of Convenience and Economy, I have already indicated the combinations of the water heaters and cereal cookers. Your attention is called to the cut showing a McDougal Kitchen Cabinet equipped as an electric cooking table. The combination outfit is almost a complete kitchen in itself. Its use will permit a smaller kitchen with less pantry and closet room. The manufacturers are seeking to co-operate with the furniture dealers, and others, to bring about such combinations.



Electric Grid



Electric Broiler

REASONS FOR TRYING AND TESTING COOKING
AND BAKING OUTFITS

This discussion leads me to the very important and practical question of the use of kitchen outfits by the Central Station men themselves.

(1). In the first place, gentlemen, the lighting company that seeks to exploit electric heating without having any personal experience with the devices is very much in the position of a bald headed man trying to sell hair restorer.

(2). In order to intelligently recommend the *best*, the Central Station should carefully investigate and test the material on the market.

(3). Taking up electric cooking is inaugurating a new and far reaching policy. The Central Station should have a "first hand" knowledge of the cost of operation in order to fix the proper rate, whether 3, 4, 5 or 6c.

(4). Recording ammeter charts should be taken from cooking outfits in practical operation and compared with the station load curve, to be sure that most of the load is "off peak" and how much.

(5). The Lighting Companies should personally keep in close touch with the latest developments, not only of the individual devices, but in their application and installation. They should be in a position to help the art by their own suggestions and experience. In that way these conventions in the future will become the clearing house for such ideas.

In view of these facts every Central Station should immediately obtain, if it has not already done so, one or more outfits for personal and practical use in its own organization.

AIR HEATING

It now remains for me to say a word on electric air heating. The luminous radiator is a particularly attractive device. I am not going to recommend heating of houses on a large scale by electricity, but for auxiliary and supplementary heating, especially in fall and spring, there is undoubtedly a large field. A large number of these radiators can be placed among the well-to-do residents of the State. The demand is indicated by the large sale which these beautiful and convenient radiators have already had. Let me suggest that they are as attractive advertisements in your own homes, as they are in your show windows.

CONCLUSION

In conclusion; it has been my privilege to make the acquaintance of the Central Station men of Ohio and to attend their

conventions the past two years; and in aggressiveness, as well as in the character and regularity of their meetings, their record is second to that of no State Electrical Association.

I can vouch for one large Manufacturing Company which is thoroughly organized to push the business of electric heating devices in the middle west, and with the hearty co-operation of Ohio Stations, the outlook is bright for the O. E. L. A. to maintain its lead.

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